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Dev (1948 / 195) Department.

Ms SERIES.

G.O. No. 5386

Dated 2 11 1948.

[Despatch Abstract.]

AGRICULTURE : SCHEMES FOR THE BREEDING ON A LARGE SCALE THE PREDATORY BEETLE RODOLIA CARDINOLIS FOR THE CONTROL OF ICERYA PURCHASI : FINAL REPORT : FORWARDED.

GOVERNMENT OF MADRAS
Development Department.

Letter (Ms) No. 5386. Dated, the 2nd November 1948

From

W.R.S. Sattianathan, Esq., I.C.S.,
Secretary to Government.

To

The Secretary to the Indian Council
of Agricultural Research, NEW DELHI.

Sir,

Sub: AGRICULTURE - Scheme for the breeding on a large scale the predatory beettle Rodolia Cardinalis for the control of Icerya Purchasi - Final Report - Forwarded.
Ref: Your letter No.F28(18)/47.A dated 8th August 1948.

I am directed to forward herewith three copies of the final report of the scheme mentioned above as required in the letter cited.

Yours faithfully,

Sd/.
for Secretary to Government.

Copy to the Director of Agriculture.

INDIAN COUNCIL OF AGRICULTURAL RESEARCH.

SCHEME FOR BREEDING ON A LARGE SCALE THE PREDATORY BEETLE "RODOLIA CNARDINALIS" MULS-FOR THE CONTROL OF ICERYA PURCHASI' MASK IN KODAIKANAL AND ON THE NILGIRIS, MADRAS PROVINCE.

Summary of the Annual Report for the Year 1st July 1947 to 30th June 1948.

PART I.

Section A - Introduction.

1. PERIOD: The period under report covers the work done from 1st July 1947 to 30th June 1948. The scheme was sanctioned for a period of two years from 1st November 1945 to 31st October 1947 and was financed jointly by the Indian Council of Agricultural Research and the Madras Government. It has been extended for a period of one year from 1st November 1947 to 31st October 1948, forming part of the All India Coordinated Scheme for the control of Icerya purchasi under the auspices of the Central Government and the Madras Government.

2. CENTRE OF WORK: The scheme was continued to be worked both at Fernhill on the Nilgiris district and at Kodaikanal in Madura district.

3. SANCTIONED GRANT: The total sanctioned amount for the scheme was Rs. 41,100 for the two years from 1st November 1945 to 31st October 1947 to which the Indian Council of Agricultural Research contributed Rs. 9,600. The sanctioned grant for the extension period of one year from 1st November 1947 to 31st October 1948 is Rs. 17,850, the share of expenditure to be borne equally by the Government of India and the Madras Government at Rs. 8,925.

4. EXPENDITURE: The expenditure incurred during the year was Rs. 18,788-

5. STAFF: Sri P.S. Narayanaswami, Assistant Entomologist, Fernhill, continued to hold charge of the scheme during the year. The staff consisting of one Assistant in Entomology with four fieldmen at Kodaikanal and six fieldmen at Fernhill continued to work in the scheme till 31st October 1947. From 1st November 1947 when the scheme merged with the All India Coordinated Scheme for the control of Icerya purchasi the fieldmen staff of ten was reduced to half and the technical staff now consists of one Assistant in Entomology and two fieldmen at Kodaikanal and three fieldmen at Fernhill. The scheme continued to work under the guidance and control of the Government Entomologist at Coimbatore.

6. OBJECT OF THE SCHEME: The chief object of the scheme is the breeding and liberation of the predator Rodolia cardinalis Muls, on a mass scale in the fluted scale - Icerya purchasi, Mask - infested areas on the Nilgiris and at Kodaikanal to check its further spread and bring it under control in these areas.

SECTION B - Approved Technical Programme.

1. Mass breeding of the predator - Rodolia cardinalis, Muls. to meet the requirements of the Madras Presidency and also to arrange supply of initial stock to other Provinces and States. This is the main work of the staff.

2. Improvement of technique of breeding the predator.

3. Survey of the infested areas to note the degree of incidence of the pest for regulating releases of the predator.

4. Study of alternate host plants.

5. General observations on the effect of weather conditions on the pest and the predator.

6. Study of the natural enemies other than Rodolia cardinalis, Muls

7. Trials to be made with a more vigorous stock of Rodolia cardinalis Muls to be imported into India from abroad.

8. Attempts to breed a natural enemey new to India - Crytochaetum iceryue Sku. imported from abroad and to colonise it in the fluted-scale regions.

SECTION C - Results.

General: During the year the breeding of the predator Rodolia icardinalis Muls. was kept at a high level, in spite of the reduced staff, and large numbers of them were released, wherever the pest incidence necessitated. Better technique was adopted to keep up the breeding of the predator. New areas on the hill and plains, wherein the likelhood of the pest appearing seemed possible, were systematically examined. The control of the pest was throughout maintained at a highly satisfactory degree and its incidence greatly reduced by the aforesadd measures.

1. MASS BREEDING OF THE PREDATOR - RODOLIA CARDINALIS, MULS - TO MEET THE REQUIREMENTS OF THE MADRAS PRESIDENCY AND ALSO TO ARRANGE SUPPLY OF INITIAL STOCK TO OTHER PROVINCES AND STATES: During the year under review a total of 47,030 of the predatory beetles was released in the fluted-scale infested regions; 26,680 on the Nilgiris and 20,350 at Kodaikanal. In the released areas, the pest was kept under check and there was a marked reduction in its incidence. Enough stock of the beetles was always kept on hand to meet the demand for supply to other Provinces and States for purposes of release as well as breeding. A total of 3,420 beetles was supplied to the Entomologist, Fluted Scale Control Scheme, Government of India, Bangalore, for releases.

2. IMPROVEMENTS OF TECHNIQUE OF BREEDING OF THE PREDATOR: No important improvement in the breeding technique, other than those already made in the previous years, were brought into practice. Wooden trays continued to prove superior to glass bottles and jars for rearing the predator was felt essential specially during the chill monsoon and the cold, frosty and wintry months. The breeding was maintained at a high level by using the warm chambers. A bigger warm chamber to accommodate all the stages of the predator was devised and brought into use.

3. SURVEY OF INFESTED AREAS TO NOTE THE DEGREE OF INCIDENCE OF THE PEST FOR REGULATING RELEASES OF THE PREDATOR: In Kodaikanal and on the Nilgiris, the Icerya infested areas were surveyed regulalry and periodically and releases of the predators made in sufficient numbers and at proper intervals. By this the pest was successfully kept under close check. A careful watch was maintained in uninfested localities, to be ready for grappling with the pest, if it made its appearanee there, by chance. New citrus areas in the lower Palnis and in Bodinaickanur in Madura district hitherto not surveyed were examined and found to be free from infestation. On the Nilgiris, citrus areas in Kolocambai were examined and a light infestation was noted which was promptly tackled by releasing the predator. Subsequent examinations revealed the scale only in a very stray form.

4. STUDY OF THE ALTERNATE HOST PLANTS: Ten more plants were recorded for the first time as alternate food plants of the scale besides the already listed ones. Besides, the main ones, citrus and wattles, coffee tea and casuarina, which are economically important have also been found occasionally to harbour the pest.

5. GENERAL OBSERVATIONS ON THE EFFECT OF WEATHER CONDITIONS ON THE PEST AND THE PREDATOR (a) Pest: As has already been stated, the scale showed decreased activity during the rainy monsoon and cold winter period. During the year, due to the absence of the North-East monsoon rains from October to December, the pest was saved from the washing down effect of the rains. The subsequent cold weather, though acted mechanically in prolonging the life-cycle, did not materially reduce the incidence. So, on the whole, the pest had favourable weather conditions for multiplication.

(b) Predator: The predator has also been observed to be similarly affected adversely by the monsson and cold weather conditions but to a greater degree. The lack of rains from October to December brought the early setting in of cold weather conditions and produced highly unfavourable conditions for the thriving of the predator. So the predator balance in

nature was brought down.

6. STUDY OF THE NATURAL ENEMEIES OTHER THAN RODOLIO CARDINALIS MULS: THE following mentioned natural enemeies of the scale were continued to be noted in the field during the different parts of the year:

(1) Rodolia roseipenis (2) Scymnus sp. (3) Stathmopoda melanochra (4) The cecidomyid (5) The chrysopid and (6) the black-mite - Of these Rodolia roseipenis was noted to be next in importance to Rodolia cardinalis occurring almost throughout the year.

7. TRIALS MADE WITH A NEW STOCK F RODOLIA CARDINALIS MULS. IMPORTED INTO INDIA FROM ABROAD: A stock of 24 beetles and 25 grubs of American origin imported into India by the Plant Protection Adviser to the Government of India was brought to Fernhill from Bangalore in August 1947 and multiplied. Three generations of the American stock were bred pure and the total number of beetles emerged was 1,581. These were mixed with the local stock to infuse fresh vigour into them. Comparisons made between the American and local beetles showed little difference in biological traits.

8. ATTEMPTS TO BREED A NATURAL ENEMEY NEW TO INDIA - Cryptochaetum iceryae Sku - imported from abroad and to colonise it in the fluted scale regions: Seven consignments of the fluted scale, parasitised by Cryptochaetum iceryae Sku were brought to Fernhill from Bangalore, beginning from August 1947. Of these the first two gave rise to 46 parasites and these were released in Icerya infested places for colonisation. But the parasite did not establish itself. The subsequent five consignments did not give out any prasites.

MISCELLANEOUS.

PLANT QUARANTINE WORK: The two plant quarantine stations located at Mettupalayam for the Nilgiris and at Shembaganur for Kodaikanal, continued to watch during the year, the traffic in plants and plant products, intercepting unauthorised transport of plants and plant materials declared as carriers of Icerya purchasi. The intercepted materials were allowed to proceed, only after subjecting them to fumigation to safeguard that the fluted scale is not introduced elsewhere.

VISITORS: The Plant Protection Adviser to the Government of India, New Delhi, the Director of Agriculture, Madras, and the Government Entomologist, Coimbatore, inspected the work at Fernhill laboratory during the year.

PART II.
DETAILED ANNUAL REPORT.

1. MASS BREEDING OF THE PREDATOR, RODOLIA CARDINALIS, MULS. One of the main objects of the scheme is to check the incidence and spread of the fluted scale - Icerya purchasi - with the help of the predator beetle - Rodalia cardinalis - on the Nilgiris and at Kodaikanal. Major attention was therefore devoted to the breeding and liberation of the beetles. In all 47,030 beetles were bred and released, 26,680 on the Nilgiris and 20,350 in Kodaikanal during the year. The details of the monthwar releases are as given under:

Period.	Number of predators released. On the Nilgiris	In Kodaikanal	Total.
July 1947	1,110	2,000	3,100
August 1947	1,400	1,200	2,600
September 1947	1,400	1,450	2,850
October 1947	1,600	1,500	3,100
November 1947	1,400	1,900	3,300
December 1947	700	1,000	1,700
January 1948	1,520	1,800	3,320
February 1948	7,400	700	8,100
March 1948	2,310	1,000	3,310
April 1948	2,700	1,600	4,300
May 1948	3,150	3,000	6,150
June 1948	2,000	3,200	5,200
Total for 1947-48.	26,680	20,350	47,030.

Consignments in all amounting to 3,420 beetles were supplied to the Entomologist, Fluted-scale Control Scheme, Government of India, Bangalore, for his use. Besides these a large stock of beetles was always maintained in both laboratories to continue the breeding and to meet the urgent demands, if any, from other Provinces and States.

2. IMPROVEMENT OF THE TECHNIQUE OF BREEDING THE PREDATOR: The predator grubs were reared in wooden trays, as they were found to be better than glass bottles and jars, the main advantges being (1) elimination of moisture in the containers (2) avoidance of contact with the cold surfaces of the receptacles, (3) easier handling, and (4) economy of space, etc. The trays were kept inside improvised warm chambers, during the rainy and cold months, when the breeding generally gets slackened.

3. SURVEY OF INFESTED AREAS - ICERTYA- infested areas on the Nilgiris, Kodaikanal and on the plains were kept under constant observation at regular intervals, and the predators released, whenever it was found necessary. The following are the localities surveyed:

Host Plant infested.	On the Nilgiris.	At Kodaikanal	On the plains
CIRTURS	Coonoor Taluk: Kolocambai, Inthurmuttam, Araihatti, Kilmjada, Blackbrdige, Wellington, Orange Valley and Asoja Estate Ootacamund Taluk: Maragal, Kukkal, Hruilatti, Kadanad and Fernhill	Lower Palanis: Perumalmalai, Sreenivasapursam, Water-falls area, Mudalaipuram, Villpatti and Pallangi and Shembaganur.	Pattiveerannpatti (Madura district) and Periakulam (Madura Dt.)
WATTLE:	Coonoor Taluk: Wellington, Aravakadu, Bandishola, Coonoor, Kattabettu, Gudahalahalla and Kilkotagiri Ootacamund Taluk: Ithalar Silahalla, Dodabetta, Honnathalai, Vadishola, Pudumund, Woodbank Estate, Madithorai Jackalo Mullikorai, Bishopsdown Manjarakorai, Mysore road area, Kandal, Hadashola and Kavilorai.	Upper Palanis: Mannavannur, Poondi and Kumbur. Lower Palanis: Kodaikanal, Villapatti, Shembaganur, Korapur, Tigershola, Mudaliarpuram, Attnampatti, Subramaniapuram	-nil-
CORSE:	Ootacamund Taluk: Pykara, Kuruthukuli, Parson's Valley, Kalhatti road, Marlimund, Nanjanad road, Mysore road, Ithalar, Bishopsdown, Race Course area, Kowhatty, Dairy farm area, Kandal Amphill, Dodabetta and Lovedale.	Upper Palanis: Poombarai	-nil-
ROSE	Gudalur Taluk: Rockwood estate and Devarshola tea experimental station.	-nil-	-nil-
CASURINA:	nil.	-nil-	Periakulam (Madurai Dt.)

The degree of incidence of the pest on the Nilgiris during the year was severe to moderate on gorse, light on wattles, light to stary on citrus and wattles and scarce on gorse. At the Top Station area adjoining the Travancore border stray scales were noted. Large citrus areas in the Lower Palnis were surveyed for the first time and found free from infestation. On the plains at Periakulam and Pattiveerannpattai, the scale incidence was scarce to nil on citrus and casuarina.

4. ~~STUDY~~ STUDY OF THE ALTERNATE HOST PLANTS: A careful lookout was kept for alternate host plants of the scale as the pest has earned a great notoreity for its commopolitan tastes. It is a matter of some relief to see that it has not so far taken to any crops of economic

importance, Besides the already listed formidable of array of over 100 host plants, the following ten more new species were recorded during the year:

Sl. No.	Name of Plant.	Places of scale incidence.
1	Fragaria elator (Strawberry)	Kodaikanal
2	Aster sp.	-do-
3	Chrysanthemum sp.	-do-
4	Dahlia sp.	-do-
5	Convolvulus lineatus	-do-
6	Solanum torvum	-do-
7	Cymbopogon citratus (Lemongrass)	-do-
8	Debregeasia velutina	-do-
9	Hypericum hookerianum	The Nilgiris
10	Neolitsea zeylanica	-do-

5. INFLUENCE OF THE WEATHER FACTORS ON THE SCALE AND ITS PREDATOR ICERYA: From the observations recorded so far, the breeding and multiplication of the scale get retarded during the cold and chill months while heavy rains wash them down by sheer force. The current year's seasonal factors, however, appear to have been more favourable to the pest. The North East monsoon which is usually in full swing during October-November was a complete failure and as such the prolific multiplication of the pest went on unhindered. The subsequent cold weather during December January had no deleterius effect except for the slight prolonging of the life-cycle. Rodolia cardinalis. The response of the beetle to the weather factors is more or less same as in the case of their host, but they appear to be less hardy as shown by their higher rate of decline than that of the scales when adverse weather conditions prevail.

6. STUDY OF THE NATURAL ENEMIES OTHER THAN RODOLIA CARDINALIS. Muls. Rodolia riseipenis, Scymnus sp. Stathmopoda melanochra, the Cecidomyid, the Black mite and the Chrysopid were recorded as the local enemies on Icerya purchasi. Excepting Rodolia cardinalis which was found to occur almost throughout the year, the othwers were met with only occassionaly. None of these are as efficient as the imported beetle and it looks as if even their combined efficiency was not equal to that exerted by Rodolia cardinalis.

7. NEW STOCK OF RODOLIA CARDINALIS muls. A consignment of beetles was imported by the Plant Protection Adviser to the Government of India from America. Of these 24 adults and 24 grubs were received to the Laboratory at Fernhill for breeding purposes. These were thriving quite satisfactorily in the new surroundings and in all 1,581 beetles were reared in the course of three generations. The adults were subsequently mixed up with the local stock, to infuse fresh blood, for breeding.

8. CRYPOTOCHAETUM ICERYAE SKU. Five consignments of Icerya purchasi parasitised by Cryptohaetum iceryae imported by the Plant Protection Adviser to the Government of India, were brought to Fernhill from Bangalore during August 1947. Forty six flies emerged from three of the consignments, the other two not producing any and the flies were released near Fernhill, where the requisite stage of the host for parasitisation was in abundance. The released places were kept under careful observation and the subsequent examinations did not show any indication of the flies having established themselves anywhere near the liberated spots. Two more consignements were obtained during March April 1948 for further trails, but the results were equally unsuccessful.

9. MISCELLANEOUS - PLANT QUARANTINE WORK: The two plant quarantine stations, at Mettupalayam (for the Nilgiris) and the other at Shembaganur (for Kodaikanal) continued to work during the year. All plants and plant products notified as carriers of Icerya purchasi transported out of the Nilgiris and Kodaikanal were intercepted and allowed to proceed only after fumigating them with "Cyanogas". The measure, safeguarded inadverten spread of the pest from the hills into free areas. Non-notified plant materials were also examined to see whether the scale

has taken to new hosts. The important plant products intercepted and fumigated during the year are given below:

Sl. No.	Name of materials.	Quantity intercepted & fumigated. From the Nilgiris. Tons.	From Kodaikanal. Tons.
1	Wattle bark	411	127½
2	Acacia seedings.	---	62
3	Rose plants and cuttings.	28	807
4	Plum plants and cuttings.	140	--
5	Peach plants and cuttings.	101	-
6	Pear plants and cuttings.	45	100
7	Verbena plant cuttings.	..	67
8	Casuarina seedlings.	..	52
9	Citrus seelings.	100	127
10	Eucalyptus seedlings.	25	127
11	Helichrysum seelings.	..	70
12	Bougain villea cuttings.	..	35
13	Magnolia seelings.	..	11
14	Box wood cuttings.	..	430
15	Apricot plants.	.2	..
16	Strawberry plants.	12	..
17	Raspberry plants.	6	..

In addition, large quantities of Eucalyptus, Acacia and Hypericum leaves and brushwood, used as packing material were fumigated before allowed to cross the borders. A few varieties of hill flowers taken down from the hills were also examined for the scale.

AN OVERALL REVIEW OF THE WORK OF THE SCHEME for 1947-48:

(a) Progress achieved: During the year 47,030 predators were released in the infested areas on the Nilgiris and at Kodaikanal. The systematic and timely releases appear to have kept the pest under control. Three thousand four hundred and twenty beetles were supplied to the Entomologist, Fluted-Scale Control Scheme of the Government of India stationed at Bangalore for his use. Ten more alternate host plants of the scale were recorded for the first time.

Future work: The control of the pest has been successfully effected in both the areas and its incidence brought to the lowest degree. Still the possibility of its flaring up once again cannot be ruled out and as such, the breeding and liberations have to be continued until such time the pest is reduced to an insignificant level even on wild vegetation. The search for alternate host plants should be continued as it would give us an idea about the potentialities of the pest.

In conclusion it may be mentioned that but for the intesive work, there was always the possibility of the pest assuming more serious proportions and taking to economic crops life fruits as it had done in the other countries.

P.S. NARAYANASAMI
Assistant Entomologist.

Agricultural College and Research Institute, Lawley Rd, Post.Coimbatore.
8th September 1948,

S. RAMACHANDRAN
Government Entomologist.

No.F.23(22)/48.A.

INDIAN COUNCIL OF AGRICULTURAL RESEARCH, "P" Block,
Raisina Road, New Delhi,
the 12th February 49.

From

S.M. Srivastava, Esq., M.Sc., I.C.S.,
Secretary.

To

The Secretary to the Government of Madras,
Development Department, MADRAS.

Subject:. ANNUAL PROGRESS REPORT ON SCHEME financed by the Indian Council of Agricultural Research - Abstract of Practical results.

Sir,

I am directed to say that the marginally noted Report and Abstract of Practical Results were examined by the Entomology Committee at its meeting held in October 1948. The Committee noted the Report and had no comments to make.

Breeding of Rodolia Cardinalis -Madras. 1 Report for 1947-48 and 2. Abstracts of Practical Results.

A copy of this letter is being endorsed to the Director of Agriculture, Madras, with reference to his letters No.67663-AII/48.2 and 67663-A.II/47-6 dated the 20th August 1948 and the 21st October 1948 respectively, for information.

Yours faithfully,

Sd/. for Secretary.

No. F.23(22)/48.A.
INDIAN COUNCIL OF AGRICULTURAL RESEARCh, "P" Block,
New Delhi, dated the 2nd May 1949.

From

The Secretary,

To

The Secretary to the Government of Madras,
Development Department, MADRAS.

Sub: ABSTRACT of practical results achieved under the Scheme for the breeding on a large s-cale the predator "Rodalia Cardinates" for the control of icerya purchasi in the Nilgiris and Kodaikanal.

Sir,

I am directed to say that the note cited above received with your letter No.67663-A-II/48.2 dated the 20th August 1948 was considered for publication in one of the Council's journals as practical results of economic value are reported to have been achieved under the scheme. The note in its present form is not, however, considered suitable for publication. This may, therefore, be revised and a connected and readable account in the form of a popular article may be sent to this office for further necessary action.

Yours faithfully,

Sd/. for Secretary.

A NOTE ON THE CONTROL OF ICERYA PURCHASI MASK.? IN SOUTH INDIA.

Icerya purchasi, Mask. popularly known as the Cottony cushion scale or the Fluted scale, has long been recorded as a serious pest of fruit trees in foreign countries. The scale had somehow, been inadvertently introduced into this Presidency, probably with some exotic fruit plants and had established itself fairly well on the Niliiris before its incidence was brought to the notice of this Department in 1928. It was first found on a virulent form on the wild wattle (Acacia dealbats), the commercial wattle (Acacia decurrens) and weeds like broom - Cytisus scoparius. St. Johns wort Hyporum Mysorensis, grose - Ulex europes- etc. etc., Subsequent observations reveleased that the scale had over a hundred plants - comprising mostly of wild vegetation - within its range of infestation. The control of the pest by the importation and subsequent large scale breeding and liberation of its specific predator - Rodalia Cardinalis. Muls has been one of the outstanding achievements in the field of biological control by the Madras Agricultural Department.

THE SCALE AND ITS HABITS: The scale is easily distinguished from its allies by its characteristic white coloured, stout and plumpy eggsae with the conspicuous longtitudinal corrugations on the surface. It is highly prelific and is found in colonies or masses on the different parts of the affected plants or trees. The life-history of the scale is briefly as follows: Each eggace may contain about a thousand or more of the small trick-red eggs and the tiny nymphs hatch out in instalments spread over a period of even two months. The latter also are red in colour with alengate black legs. The nymphs on hatching crawl towards the tender portions of the plant and fix themselves in some favourable spot. Adults and younger moults and change their place of feeding after every moult. The duration of the nymphal stage appears to vary according to the environmental factors? On the plains, its extends from 46 to 93 days, on the hills to 2½ - 3 months during the hot season and be a couple of months more during the cold weather. It is also obvious that warm and bright weather conditions are deficinitely more favourable for the prolific multiplication of the scale while monsoonish and cold periods retard it.

THE CONTROL OF THE PEST: The high biotic potentialities of the scale, its cosmopolitan tastes and its notoriety as a severe pest on fruit trees have us sufficient grounds to apprehend the seriousness of the situation and adopt control measures promptly. Perhaps the one redeeming feature in the incidence of the scale on the Nilgiris was that, though it was generally bad on a number of wild plants and shrubs, it had taken severely only to ACACIA DECURRENS. The commercial wattle and to organges on a mild degree. Previous experience has shown that the pest can be controlled only by biological methods and that too only by its specifc predator beetle - RODOLIA CARDINALIS. The locality was immediately secured for natural enemies. A few of them, viz. the COCINELLID, RODOLIA ROSEIPENIS, the small Seymnus beetle, the microlepidopterous caterpillar - STATHMONODA MELANOCHRA - a Cecidomyid as well as the parasitic Fungus - CLADOSPORIUM sp. were found to occur but none of them showed any evidence of exerting an apprecaible check over the scale population. Entomologists abroad were immediately contacted for the supply of live specifimens of RODOLIA CARDINALIS. In the meanthile the pest was making rapid strides on the Niligiris spreading undue alarm and some immediate relief had to be thought of. In the absnece of anything better, an intensive campaign of cutting and buring of the infested bushes of broom and St. Johns wort was arranged and a considerable area was covered during the first year. The active co-operation of the Foreign Entomologists materalised very sobn. After one or two failures, about a dozen specimens of the adults and grubs of RODOLIA CARDINALIS were producred from California during 1929 and the supply was further augmented by an appreciable consignment during 1930 from Cairo, which though welcome was, however, superflous. With the receipt of the first consignment, a breeding laboratory was opened on the Nilgiris and intensive work was taken up. After a few initial setbacks the technique of breeding was perfected and the beetle also responded remarkably well under artificial conditions. A short account of the life-history of the beetle may be of some interest here.

The adults begin to pair soon after emergence if the weather

stages of the male are not common. The female nymphs undergo 3

is bright and warm. Mature scales are selected and the eggs are laid singly, usually on the eggsacs. The egg is minute and scarlet red in colour. The grubs hatch out in 6 to 12 days and crawl about in search of young scales and promptly attach them, if they come across any. They take to bigger nymphs as they feed and develop. Both the adults and grubs feed veracicously on the eggsacs also. The active feeding stage of the grub extends from 13 to 24 days during which period it undergoes three moults. The full-grown grubs rest for a period of 3 to 9 days before they finnally turn into pupae and the adults emerge about 5 to 15 days. They are capable of living for about a couple of months and can complete a generation in 12 days during the warm weather and in about 57 days during the cold season.

Careful attention was paid to the breeding of the beetles on a large scale. The progress of the scale also was kept under close observation in the field. Consignments of the breetles were periodically released in the badly affected areas and the further progress of the beetles watched.. Within about a year of concentrated work, a phenomenal decrease was noted in the population of the scales and the colonised beetles were found to breed freely in nature which evidently indicated that the predator had established itself in the tract and was continuing its useful work. It was, therefore, decided by 1931 that a proper host-predator ratio has been established and that no further artificial fillip was required. The work was, therefore, wound up subsequently.

After a period of quiesence for over a decade, there was a sudden flare up of the scale at Kodaikanal and on the Nilgiris by 1942. Besides its virulent incident on gorse and wild wattles, it was bad on ACACIA DECURRENS and somewhat mild on oranges. Immedaite steps were again taken to establish two laboratories in the two centres. The specimens of the predator beetle, which were occurring in plenty in nature were collected and bred in their thousands. After an adequate breeding stock was built up, the surplus number was periodically released in the infested areas maintaining an approdimate target of 2,000 beetles per month. On a modest estimate, over 57,000 beetles have so far been released in the two areas during 1945-47.

It is gratifying to note that the pest has again been brought completely under control and its number probably reduced to the irreducible minimum. A careful eye is kept on its incidence and alternate host plants. The breeding and releases are being continued to prevent a reccudeadence of the pest as it occurred in 1942. The work is going on quite satisfactorily and an adequate stock of beetles is always being maintained to supply to other provinces, if there be any necessity.

The Madras Government acknowledges the kind financial assistance rendered by the Indian Council of Agricultural Research for continuing this valuable piene of work.

GOVERNMENT OF MADRAS
Development Department.

Letter No.46573-A.II/49.3. Dated, the 18th July 1949

From

W.R.S. Sattianathan, Esq., I.C.S.,
Secretary to the Government of Madras.

To

The Secretary to the Indian Council of
Agricultural Research, NEW DELHI.

Sir,

Sub: AGRICULTURE - Indian Council of Agricultural Research - Abstract of practical results achieved under the "Rodolia Cardinalis" breeding Scheme.
Ref: Your letter No.F.23(22)/48.A dated 2nd May 1949.

I am directed to forward herewith a revised article as desired in your letter cited.

Yours faithfully,

Sd/. for Secretary.

Copy to the Director of Agriculture.

/True copy/ S Jagannatham 6.4.54

Office Assistant,
Madras Record Office, Egmore, Madras.

Sk

2/4/54